AGRICULTURAL NEWS LETTER

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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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AGRICULTURAL NEWS LETTER

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The AGRICULTURAL NEWS LETTER serves as a medium of reporting new developments and new ideas in the field of agriculture, particularly as they are related to advancements through research. Material appearing herein may be reprinted in whole or in part, in the interest of advancing the general knowledge of new agricultural practices.

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WHAT FARM EDITORS ARE SAYING --

"Fortunately people are never satisfied. About two billion dollars were spent in 1953 for research leading to new products and improvements in everything from pins to tractors." -- Ray Gilkeson in KANSAS FARMER

"The good Lord has given us enough for everyone's needs, but not enough for everyone's greed." -- Jack Matlick in THE KENTUCKY FARMER

"Stop when the sign says stop, whether you see a car coming or not. Why become a statistic?" -- Fred Jones in INDIANA FARMERS GUIDE

"The South is booming industrially and agriculturally. It may appear on the surface that industry is getting the best hand. Actually, the move is a healthy one for all. We are moving toward a balance of agriculture and industry -- a long-time need in the South. The more industry we have the better our market will be for what we produce. In the final analysis, we will have a better South." PROGRESSIVE FARMER

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GILBERT F. (BERT) MILES, one of the world's top authorities in the field of seed disinfectants and the protection of seeds and seedlings against soil-borne disease organisms, died January 19 of a heart attack suffered while at work in Du Pont's Semesan Laboratory at Minquadale, Del. He was in charge of the laboratory. A New Yorker by birth, Mr. Miles majored in agricultural biology at Virginia Polytechnic Institute, did research in plant pathology at the Blacksburg, Va., Agricultural Experiment Station, organized the military department, and taught military tactics and science at Vanderbilt University, served as second lieutenant during World War I, and was on the faculty of Pennsylvania State College agricultural extension department, prior to joining the Du Pont Company in 1928. His pioneering research work was, in large measure, responsible for the development and widespread acceptance of both the mercurial and thiram seed-treating materials. Bert Miles had long served as a member of the advisory board for "Agricultural News Letter." His cooperation and counsel will be missed.

ONE HUNDRED YEARS OF PROFESSIONAL ENTOMOLOGY

By David G. Hall*
Agricultural Research Service Information
U. S. Department of Agriculture

In 1854, Americans first become concerned enough with the depredations of insects to demand professional help in controlling them. It was in that year that the first federal entomologist, Townend Glover, was employed by the U. S. Government, and Asa Fitch, the first state entomologist, was employed by the state of New York.

This year -- after a century of progress -- entomologists, pest control operators, and insecticide manufacturers and distributors are banding together for an intensive campaign to bring before the public the great entomological accomplishments of these 100 years and the part that insect control can play in our future in building well-fed, healthy Americans and helping other nations control insect-borne diseases, and protect food, feed, and fiber from the pests.

Early entomologists certainly did not foresee the possibilities of insecticides in insect control. In 1865, an editorial in the first number of the "Practical Entomologist" stated authoritatively: "The proposed decoctions and washes we are well satisfied, in the majority of instances, are as useless in application as they are ridiculous in composition, and if the work of destroying insects is to be accomplished satisfactorily, we feel confident that it will have to be the result of no chemical preparations, but of simple means, directed by a knowledge of the history and habits of the depredators."

The Colorado potato beetle, however, became such a problem in the 1860's that arsenicals were tried for control. Paris green came into wide use, and with London purple -- introduced in 1878 -- became the most commonly used insecticide until 1900. Lead arsenate was first prepared in 1892, and by 1910 had largely displaced Paris green and London purple. It held its lead in use against orchard pests until the advent of the organic insecticides shortly after World War II.

Inorganic fluorine compounds and lime-sulfur came into use as insecticides at the turn of the century. Study of harmful residues left by insecticides was begun shortly after 1900.

Testing of large numbers of compounds of known structure and unknown toxicity upon several species of insects, and selecting those that are effective, has in recent years brought a deluge of new and potent insecticides. The chlorinated hydrocarbons and organic phosphorus-containing insecticides -- some of the latter with systemic properties -- have ushered in an era of insect control whose necessity and development were never dreamed of in 1854 when the U. S. Patent Office first employed Townend Glover to collect "information on seeds, fruits, and insects in the United States."

*The author heads the supervisory committee to spearhead the 1954 celebration of 100 years of professional entomology.

DEFEAT OF THE PICKLEWORM

By Dr. Clyde R. Cunningham, Dr. V. N. Lambeth, and Prof. Wilbur Enns
University of Missouri

During the last twenty years the production of pickling cucumbers in Missouri has been more or less a game of "fox and the goose". A new area would open up and just about the time it would get going the pickleworm would catch up with the deal and the end was just a matter of time. Then a new venture would start in another area of the state only to suffer later the same fate.

The main reason for this unsettled condition was that until about 1946 there were no insecticides that would effectively control this cucumber insect.

With the introduction of methoxychlor the "tide of the battle" began to shift. From 1948 to 1950 acreage increased rapidly in the Springfield area. Growers began to follow the county agents' and brining station representatives' recommendations which were based on the research work of the College of Agriculture. The recommended program consists of two pounds of 50 per cent wettable methoxychlor, one pound of 25 per cent wettable lindane and two pounds of zineb in 100 gallons of water. The mixture is applied under pressure at approximately 10-day intervals, depending on the weather.

In this particular situation, methoxychlor seemed to be the material that had been needed. It appears to be very effective in killing the adults, especially females seeking to lay eggs on the vines and fruits. The residual toxicity is long enough to kill the worms hatching from eggs that may have been successfully laid. There may be two, three, or more generations per year of the pickleworm. It usually over-winters in the pupal stage in rolled leaves, under surface trash, or in the ground. It takes four or five weeks to complete one generation, the first starting usually in June. Methoxychlor apparently not only controls this dreaded insect that had continually caused failure in cucumber production but is also effective in controlling the spotted and striped cucumber beetles, the latter being carriers of the wilt organism. The lindane is mainly used as an aphicide early in the growth of the plants.

During this past season one brining station received nearly 25,000 bushels and reported only three pickleworms were found.

Last year in Missouri, with good cultural and insecticide practices, even under drouth conditions, cucumbers were a profitable crop. Even without irrigation, some growers, following recommendations closely, grossed $400 and $500 from each acre where many other crops were almost a total loss.

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EDITOR'S NOTE: The above article is presented here through the courtesy of the authors and of "Food Packer" magazine, for which it was originally written.

PREDICTING YIELD RESPONSE OF CORN TO NITROGEN FERTILIZATION*

The use of commercial nitrogen fertilizers for corn, still a relatively new practice in the Midwest, appears to be replacing the conventional practice of growing legumes and applying manure. Accompanying this trend is an increased need for a satisfactory method of evaluating the soil so that the magnitude of crop response to nitrogen applications can be predicted. A series of experiments conducted in Iowa over a period of several years indicate that the nitrification rate of soil provides a good index to the effectiveness that can be expected from commercial nitrogen applications. The results of these experiments also indicate that, soil conditions being equal, thicker stands of corn show higher response to nitrogen fertilization.

Nitrification rate, in this case determined by the amount of soil nitrogen nitrified during three weeks incubation, is proposed as a procedure for evaluating the nitrogen requirements of soils. By the use of a modified nitrification method, the rate of nitrate production has been correlated with the response of corn to nitrogen fertilizer in a series of experiments conducted in Iowa over a period of seven years. The nitrogen fertilizer experiments on corn that were selected for correlation with nitrification rate were carried out on fields where the farmers were following cultural, soil management, and cropping practices typical of their area. All of the soil samples were taken to a depth of 6" before application of fertilizer to the area. For correlation with nitrification data, yield increases resulting from applications of nitrogen (40 to 60 lb/acre) were used.

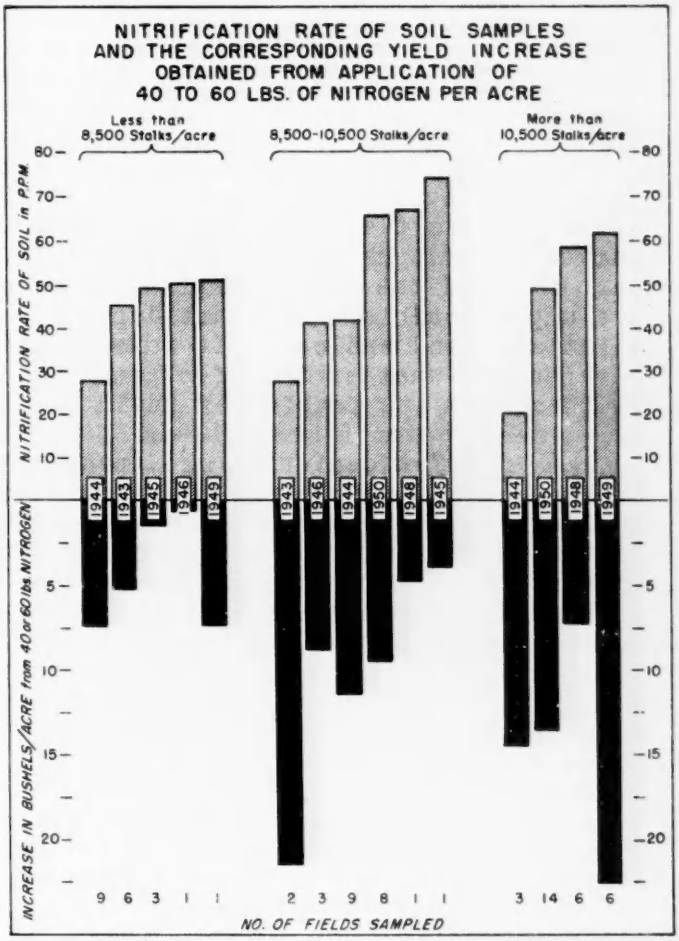
The response obtained from application of nitrogen fertilizers to corn is greatly influenced by the thickness of stand. A good response from nitrogen fertilizer may be obtained with a relatively thick stand of corn where no response would be obtained on the same soil with a thin stand. Consequently, for presentation of results, the experimental fields were arbitrarily separated into the following three groups: less than 8,500 stalks per acre, thin stand; 8,500 to 10,500 stalks per acre, medium stand; and more than 10,500 stalks per acre, thick stand.

In the graph accompanying this article, the relationship found between soil fertility, density of plant population, and fertilizer response is shown. Data from individual samples are combined for each year under test.

Except for one season, a significant correlation was obtained between nitrification rate and the response of corn to the application of nitrogen fertilizer. The 1949 season was exceptionally favorable for corn production, and large increases were obtained even on relatively fertile fields. The results serve to stress the influence

*Condensed from a paper by J. W. Fitts, W. V. Bartholomew, and H. Heidel, entitled "Correlation between Nitrifiable Nitrogen and Yield Response of Corn to Nitrogen Fertilization on Iowa Soils", which appeared in SOIL SCIENCE SOCIETY OF AMERICA PROCEEDINGS, Vol. 17, No. 2, 1953.

of plant population density on the magnitude of yield response to nitrogen. At comparable rates of nitrification, a profitable yield response to nitrogen fertilization was obtained where the nitrification rate is less than 40 ppm (parts per million). On fields with thick stands, profitable yield increases were generally obtained when the nitrification rate was less than 50 ppm. A point of interest is that profitable responses were obtained from nitrogen fertilization on some fields with nitrification rates above 50 ppm. The percentage of such fields increased with increases in thickness of stand. The tests also indicated that, with good cultural practices, freedom from disease and insects, good fertility in stand, and optimum climatic conditions, profitable response from nitrogen fertilizer application may be obtained on unfertilized fields yielding over 100 bu. per acre.



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EDITOR'S NOTE: The above investigation clearly shows the value of nitrification data in predicting response to nitrogen fertilizer. Such information for other areas and other crops could undoubtedly increase the over-all efficiency of nitrogen fertilization practices.

IS IT TOXIC? DOES IT BURN? WILL IT EXPLODE?

Mr. Rat, smirking over his unlimited supply of food containing a new experimental compound, helps Du Pont medical researchers establish the potential toxicity of the chemical. Dozens of questions involving potential hazards of every new material must be answered before it can be recommended for use by the general public. A new booklet, "Protecting the Public Health", tells of the detail in which these safeguards are carried out. If you would like a copy, write AGRICULTURAL NEWS LETTER, Du Pont Company, Wilmington, Del.

"LET'S TAKE THE LONG VIEW"

By Crawford H. Greenewalt, President
E. I. du Pont de Nemours & Company

We have in this country not an economy of necessity, but an economy of abundance. Our consumption of food, shelter, and clothing -- all necessities of life -- is predictable within reasonably narrow limits. Our consumption of automobiles, television sets, washing machines and the other luxuries of an abundant life is in large measure unpredictable. For that depends not upon our desires, which are insatiable and endless. It depends simply on the average outlook of our people; whether they feel safe in increasing their consumption or whether they are fearful of their economic well-being.

A few centuries ago, people had few luxuries and their preoccupation was mainly with keeping themselves fed, clothed, and sheltered. In those days, I suppose depressions were influenced more by the weather and its effect on agriculture than by any other single factor. Even in this area forecasters were notoriously inaccurate, as I am afraid they are today, since weather still seems frequently unpredictable.

In modern times, however, the causes of recession are much more nebulous, since they depend not upon natural phenomena but upon human decision. Whether or not we will have a recession in 1954 will depend largely upon the direction of the national psychology and on decisions that are influenced less by rational economic reasoning than by simple confidence and optimism. Obviously this involves great numbers of people, and the governing decisions will be made not only in business offices and board rooms but around the dining room table in millions of American homes.

A Matter of Confidence

What we call "buying power" is in this country no arbitrary factor. For most of the things people buy are deferable. The purchase of that new automobile can be put off until next year. The current television set or washing machine or refrigerator can be tolerated a while longer. The new house doesn't have to be built. If people in the mass as consumers and as businessmen feel that they wish to defer a large percentage of their normal purchases, we will surely have a recession. If they are confident, willing, and able to satisfy their desires, we will have a boom. In short, if we could find some way of climbing into the minds of 160 million people, we could tell very easily how good or bad business is going to be.

No one has yet learned how to measure or how to influence people's confidence. A few things we do know. We know, for example, that a depression, once started, accumulates momentum like a snowball rolling down a hill, and that panic is a communicable disease far worse and far more rapid in its spread than any that affect us physically. It follows then that the business community must accept major responsibility for seeing that panic does not start. That it can do by maintaining

its confidence high and its economic temperature as near normal as possible. In this atmosphere, the corrections that will be applied will be small and not in themselves frightening.

Today, for example, business inventories are said to be high, perhaps substantially higher than can be justified by present or expected sales volume. If business people should suddenly decide to correct that situation all at once, panic and depression would almost surely ensue. If, on the other hand, the correction is made in small increments over a reasonable period of time, the problem should be manageable and confidence maintained.

Looking Ahead

But above all else, industry must keep its eye firmly fixed upon the long-term upward trend -- the amazing and dynamic industrial progress shown in this country over many years. For in the last analysis it is that upward thrust in inventiveness and productivity that is the sure and tested tool that puts an end to any depression whether it is major or minor.

Let me cite an example. The Du Pont Company recently celebrated its 150th birthday. The first available Du Pont balance sheet is for the year 1810 and in that year our assets totaled $109,000. A hundred years later in 1910, they were $81 million and today, excluding our investment in the General Motors Corporation, they are approximately $2 billion. If we translate those figures into growth rates, we find that both in the first 100 years and the last 50 our rate of growth has been about seven per cent per year compounded. The point of all this history is not to boast about the Du Pont Company's success. It is simply to remind you that in that 150-year period we had five major wars, at least six depressions of very substantial magnitude, and all conceivable shades of political climate and opinion -- and Du Pont is still here and still growing.

It would be interesting if the presidents of the Du Pont Company had kept personal diaries. The founder, the first E. I. du Pont, had to borrow money in the severe depression of 1819 to rebuild his factory that was destroyed by explosion. General Henry du Pont, his son, passed successfully through the Civil War and the two depressions that followed it. I have heard Irenee du Pont talk about sleepless nights during the depression of 1921 and Lammot du Pont discourse on the trials and tribulations of 1932. I can confess to some troubles and worries of my own.

Predictors' Follies

The point I wish to make is that when those events are viewed against the pattern of our country's steady long-term growth and prosperity, the bad times, so troublesome in their particular setting, fade first into unpleasant memories and finally to unimportant historical items in dusty and forgotten archives.

It is also interesting to note that when anyone in the past has attempted to predict the long-term future, his forecast has turned

out to be hopelessly shortsighted and pessimistic. Benjamin Franklin, for example, thought at the end of his life that it would perhaps take centuries to settle the American continent. The State of California stands as a monument to his error. Thomas Jefferson in announcing the Louisiana Purchase felt that the territory might be fully occupied after 25 generations. The railroad and the steamboat opened it up to settlement within a few decades. In the early 1900's a gentleman from Philadelphia grew enthusiastic about private motorcars and foresaw the time when there would be 100 or so in every city. I might add that he viewed this development as a boon to highway safety as it would free the country from drunken riders and wild horses.

The economist Jevons, in 1860, was alarmed at the possible exhaustion of the earth's coal supply within a few years. Sir William Crookes, a distinguished scientist, saw early starvation of the race through diminishing supplies of nitrogen. What he did not foresee was that chemistry through nitrogen fixation would within a generation or so prove his error.

What Shapes Our Economic Orbit?

I could go on with similar examples, but it should be evident that the progress of genius and inventiveness is something that is always underrated. I think, therefore, that those who become unduly alarmed at our short-term prospects are guilty simply of economic myopia. They forget that our economic orbit is shaped not by inventories, government spending, or any of the host of business indicators but by human courage, desires, and incentive.

There has been much speculation as to the reasons for this spectacular advance of our American economy. To me the answer is a simple one. It is nothing more than human ingenuity operating in an atmosphere of individual freedom and incentive.

Genius and inventiveness are found among the people of every nation. They are not an American monopoly. But the atmosphere of freedom in which we Americans live and work is unique among nations. It is in itself a creation of man's genius, an experiment born of dissatisfaction with the authority of the state, the guilds, a rigid social order, and all of the confining trappings of Eighteenth Century Europe. Our experiment in government has succeeded beyond the fondest expectations of its founders, for not even they could foresee the effects of man's daring, vision, and creativeness set free to operate without let or hindrance.

From Plow to Test Tube

The direction of our effort has changed over these two centuries of our national existence. Our first 100 years were the years of the pioneer, the explorer, setting out from the comfort of the East to conquer and settle the unknown West, to bring our continent under the plow and to create an agricultural abundance for our growing population.

Today it is research that gives the American economy its characteristic surge and its dynamic qualities. And research requires

people with the same courage, vision, and determination as those who a century ago crossed the Western Plains.

And the results achieved in our laboratories and factories have indeed been staggering. We have only to go back in retrospect to our youth to see what enormous benefits science has brought in one short generation.

Let me again quote a few figures from the Du Pont Company's experience. In the past twenty-five years the Du Pont Company has spent approximately $475 million on research, excluding the cost of the buildings and equipment with which our research is done. Over the same period of years expenditures for new plants and equipment have been approximately $1,400 million. In other words, we have spent about three dollars in productive facilities for every dollar spent in the research laboratory. And this ratio of three to one has been relatively constant over an even longer period during which our annual research bill has grown from $1 million to $50 million. During this same twenty-five years our employment has increased from 38,000 to 90,000. That growth in employment is the net of the jobs created through the introduction of new products less those lost through increased productivity. Obviously the leverage of research in making new employment opportunities is enormous.

The Ripples Spread

And that is by no means the end. For many more employment opportunities have come about elsewhere as a result of our research activities. A new material, such as nylon or cellophane, becomes the basis for increased business activity on the part of those who fabricate and sell the finished products arising out of the new basic materials which only a large business can supply. Others find new employment possibilities in the manufacture of machinery, tools and equipment necessary to these new uses. How large a circle this becomes would vary, and its radius is hard to compute, but as an example, we have estimated that for every one of our 5,000 employees making cellophane, there are two workers engaged in its conversion and distribution, whose jobs were created as a direct consequence of the development of cellophane.

I cite the Du Pont Company's figures only by way of example, for while our present $50 million annual research bill is large in the absolute, it is a very small fraction indeed of the industrial research that is being done in the country's industries.

There has been some talk in past years of the possibility that our economy is maturing, that we are reaching an industrial plateau from which we will progress only as our population increases. That point of view seems to me to be nonsense. For it is tantamount to saying that the last scientific barrier has been crossed, that there is no fruitful objective for further research, and that man's appetite for a more abundant life has been fulfilled.

Ceiling Unlimited

On the contrary, in the fifty years or so during which we

have practiced applied science, it seems to me we have made only the smallest of forward strides, and the horizons before us are unlimited and extend far beyond our present vision.

I cannot and would not try to predict the precise shape of things to come. I know that were I to do so, future events would show simply that I had been shortsighted. But I am very sure that great progress will be made and that the shape of industry 150 years from now, were I to come back and look at it, would surprise me just as much as the founder of the Du Pont Company would be astonished at the heights to which his little business has grown.

It is essential as we make our way through the squalls and alarms of 1954 that we keep our eye on the main goal, which is the continuation of our progress to greater productivity, to greater abundance, to new products for the betterment and simplification of our lives.

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EDITOR'S NOTE: The above article is excerpted from a recent speech by Mr. Greenewalt before the Commonwealth Club of California. It is presented here because the long-range viewpoint expressed is applicable to the plans of both agriculture and business throughout America. Complete text of the speech will be sent on request.

PROTECTION AGAINST LYE BURNS

In an item on the disinfecting of livestock hauling trucks, in the January-February issue of this news letter, it was suggested that vinegar be applied to any portion of the skin which might be splashed with a lye solution. While vinegar to neutralize these weak lye solutions (2% and 5%) might be effective, it is also possible that the vinegar used might not contain sufficient acetic acid to neutralize the lye. Further, it is not good practice to perform chemical reactions on human epidermis. When splashed with either a caustic solution or with an acid, the area affected should be flooded immediately with a large volume of water to flush the solution from the skin surface. If in spite of this a burn does result, medical attention should be secured.

BOOKLET FOR FISHERMEN -- If you've taken up the sport of spinning, you'll be interested in a new booklet containing many tips from the experts on this popular form of fishing. Sections on the right knots to use, selection of the proper lure, handling of a spinning reel, and qualities necessary in a spinning line are included. Requests for the booklet may be sent to AGRICULTURAL NEWS LETTER, Du Pont Company, Wilmington 98, Delaware.

EXPERIENCES WITH SODIUM BISULFITE AS A PRESERVATIVE FOR GRASS SILAGE

By R. L. Cowan, J. W. Bratzler and R. W. Swift
Department of Animal Nutrition, Pennsylvania State University

During the past 25 years, a tremendous amount of fundamental research has been focused upon the grass silage problem, with the result that today, due to improved methods and increased knowledge on the subject, the use of grass silage is increasing by leaps and bounds -- has increased in the state of Wisconsin from less than one per cent of the total grass crop in 1944 to over eight per cent in 1952.

One of the most important phases of this research has been that involving the development of additives or preservatives. Two main lines of attack have been used to achieve this purpose. The first depends upon the addition of readily fermentable carbohydrates in the form of molasses, cereal grains, etc. This method has produced good quality silage under most conditions; but it is wasteful as the materials added are expensive, and they are known to be largely lost in the fermentation process. The second general method consists of the addition of various mineral acids, which produce conditions unfavorable for fermentation and spoilage. The use of these acids has been discontinued in this country, because of difficulty of handling, and of adverse effects on the digestive system and the mineral metabolism of cattle.

Dairy heifers in the foreground are eating silage treated with sodium bisulfite in one of the Penn State palatability trials. The far end of the trough, which the cattle have scrupulously avoided, contains silage to which no preservative was added. Heifers in the background with tails toward the camera are feeding from the "bisulfite" end of a similar divided trough.

In this same category, however, sulfur dioxide gas has been used over a period of several years with considerable success, and with no apparent adverse effects on cattle. In addition to forming an acid when dissolved in the juices of the silages, the SO_2 is a powerful bacteriostatic agent in its own right. However, the disadvantages of using gaseous SO_2 are readily apparent: the safety hazard in handling of highly compressed, poisonous gas by untrained farm hands -- piping it through rubber tubing into the precarious heights of a silo -- the tedious and time consuming chore of climbing into the silo after every few feet of filling -- holding up the whole operation for 20 to 30 minutes while leveling or tramping, and injecting the gas -- which even then often results in quite spotty application if moisture conditions

are not just right. The handling and returning of cylinders -- with the extra bookkeeping and expense of handling deposits and return freight -- is another headache which discourages distributors as well as farmers.

In view of the excellent quality of the silage that could be prepared by this method, however, the advantages of an easier, more practical method of application were apparent. Sulfur dioxide has been used for many years in the preservation of human foods -- especially dehydrated and fresh fruits. For this purpose it generally has been applied in the form of the acid sulfites of sodium or calcium, which are powders or crystals and much more convenient to work with than liquid or gaseous SO_2.

Preliminary experiments conducted at Pennsylvania State University during 1951 indicated that sodium bisulfite applied as a water solution was quite effective in preserving grass silage stored in glass jars and in one small concrete silo, when applied at the rate of eight pounds per ton of grass. Two years' experience during 1952-1953 with the application of the powder to large amounts of silage have convinced us that the material is sufficiently easy to apply, and that the latitude of allowable variation in rates of application is sufficient that, with reasonable care, any farmer may use it with good results.

These trials covered a great variety of crops, harvesting conditions, and types of silos, as well as stacks and trenches. As a result, many farmers became interested and used the material on their own. In all, we estimate that approximately 1000 silos were treated during 1952-1953 in Pennsylvania.

Several inspection tours have been conducted, and to date results have been observed in about 100 of these silos. The comment most frequently heard from both tourists and farmers regarding the silages examined was to the effect that "there appears to be little room for improvement of these silages." With rare exceptions, the silages have been bright green in color, and have possessed a clean, pleasant odor similar to that of fresh-chopped grass.

Tests completed on a limited number of silages in our laboratory have shown that butyric acid formation has been practically eliminated from the bisulfite silages. Volatile acids in general are decreased, and lactic acid appears in less than normal amounts -- indicating that fermentation is not stopped, but is probably slowed down and guided in a desirable direction by the bisulfite.

All farmers interviewed to date plan to use bisulfite again and are quite enthusiastic about their results, for the following reasons:

(1) They like the quality of silage produced, especially the freedom from foul odors, and its extreme palatability to cattle.

(2) It is inexpensive -- cost to Pennsylvania farmer this year was around $.50 per ton of grass ensiled.

(3) It is safe and easy to apply and does not require costly apparatus.

The matter of "cow-preference" for bisulfite-treated silage is shown in a recently completed palatability trial in which two silages from adjacent glass-lined silos were compared. These silos had been filled with alternate loads of grass from the same crop -- one being treated with eight pounds of bisulfite per ton and the other untreated. The following table shows the effect of the bisulfite treatment on the palatability of this crop.

Day	Pounds Silage Consumed Per Cow Per Day			
	Large Pen - 24 Heifers		Small Pen - 12 Heifers	
	Bisulfite	No Preservative	Bisulfite	No Preservative
1st	39	8	32	9
2nd	31	17	28	10
3rd	35	18	32	14
4th	41	13	32	3
5th	34	10	30	6
6th	32	12	28	6
7th	40	9	30	11
8th	41	7	31	5
9th	45	6	29	2
10th	41	3	30	2
Average	38	10	30	7

These were small heifers and the consumption data shows a preference of about four to one in favor of the bisulfite silage.

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SPRING TRACTOR CARE

With warmer days arriving, it is again time to drain anti-freeze from car and truck radiators, clean out cooling systems, and provide protection against rust during the summer. But don't forget the tractor that was kept in commission for winter jobs. During the winter, a rust inhibitor in the anti-freeze solution protected the radiator from corrosion. Now, to avoid overheating and because the rust preventive may be exhausted from contamination and continued use, the radiator should be drained. Typical advice is this from International Harvester Company: "After draining the anti-freeze, a rust preventive should be added to the cooling water to protect the cooling system during warm weather operations. The inhibitor solution should be drained and discarded in the fall when danger of freezing again makes necessary the use of an anti-freeze."

NEW TRADE-MARKS FOR SUBSTITUTED UREA HERBICIDES

To aid buyers in the proper selection of a weed killer, distinguishing trade-marks have been adopted by the Du Pont Company for their remarkable new family of substituted urea herbicides (see "Agricultural News Letter" Vol. 22, No. 1, Pages 4-6).

All such compounds formulated and sold for agricultural purposes will be labeled as "Karmex" herbicide, while similar compounds intended for industrial weed control will be specified as "Telvar" weed killer.

In addition to the new trade-marks, letter symbols will identify the various compounds and types of formulations involved. For instance, the now well-known 80 per cent CMU wettable powder formulation, when sold for approved agricultural uses on crops such as asparagus, sugar cane, and pineapple, will be called "Karmex" W herbicide, and label instructions will indicate rates of use for weed control purposes. The formulation for use in industrial weed control, where soil sterilization is the goal, will be known as "Telvar" W weed killer and label instructions will be designed for industrial application.

Two additional substituted urea products will be offered in limited quantities during the current year, both of them based on the compound expressed chemically as 3-(3,4-dichlorophenyl)-1, 1-dimethylurea. "Karmex" DL herbicide, a liquid suspension containing 30 per cent active ingredient will be used for weed control in cotton under a carefully supervised program in certain sections of the South. For use as an industrial herbicide in areas of high rainfall is "Telvar" DW weed killer, a wettable powder formulation containing 80 per cent active ingredient.

It is expected that the adoption of these new trade-marks -- "Karmex" and "Telvar" -- will help simplify the problem of the consumer in selecting the type of weed killer required for the specific job he has in mind.

THE USE OF SUBSTITUTED UREA HERBICIDES IN THE SUGAR INDUSTRY

by Dr. G. L. McCall
E. I. du Pont de Nemours & Co., Inc.*

During recent years, sugar cane producers in the United States have faced a growing shortage of labor. It has become imperative to

*Condensed from an article in SUGAR JOURNAL and an address before the American Society of Sugar Cane Technologists Meeting at Houma, Louisiana. Names of chemicals have been changed to conform with current labels (see announcement at top of page) and all rates are expressed as the 80 per cent wettable powder.

increase the efficiency of all labor, while holding sugar production costs to a minimum. To meet this problem, the industry is rapidly mechanizing its field operations.

The use of chemicals in weed control operations offers many advantages in the mechanization program. These advantages are reflected in increased yields, in reduced weed control costs, and in decreased need for scarce hand labor. Since the new substituted urea weed killers offer certain possibilities for use by the sugar industry, some suggested methods will be discussed here.

The first use for which the compound now identified as "Telvar" W weed killer was adopted on a largescale was for the control of weeds around industrial installations. "Telvar" W is now being used where vegetation is a fire hazard, maintenance problem, personnel hazard, or simply where the presence of weeds is an eyesore.

To control weeds and grasses around sugar refinery installations, it is suggested that "Telvar" W weed killer be used at the rate of 40-80 pounds per acre, depending upon the problem encountered. If applied to annual weeds, less material generally is needed than where deep-rooted perennial weeds are encountered. It has been found that the younger the plant, the easier it can be controlled.

Johnson Grass

Up until the past few years, sugar cane fields in Louisiana had become more and more heavily infested with Johnson grass. In some areas, there was practically a solid infestation in cane fields and on headlands and ditch banks.

Essentially, Johnson grass control in cane fields consists of three basic steps beginning after the last crop of stubble cane has been harvested.

First, the cane field proper is fallow plowed at intervals of about two weeks, weather permitting, beginning in the spring and lasting through early summer. Six to 12 plowings usually are required to destroy established Johnson grass rhizomes. The plowings turn the rhizomes up to the soil surface where they die from exposure to the sun.

Second, Johnson grass growing along ditch banks and headlands where it cannot be reached by plowing may be controlled by the use of chemicals. If the grass on these areas is not controlled it serves as a continuous source of infestation for cane fields -- both from seedlings and rhizomes.

Previous results in various sections of the country have shown that from 40 to 80 pounds per acre of the formulation labelled "Karmex" W herbicide will kill established stands of Johnson grass. These rates have also prevented Johnson grass seedling re-establishment for a period of at least one growing season.

In general, tests have shown that this herbicide acts primarily through plant roots. Therefore, to insure maximum effectiveness,

care should be taken to see that the chemical reaches the soil in which Johnson grass is growing. This can be done by mowing and removing plant tops before treatment, or by waiting until after tops have been winter-killed and burning them. Applications during late winter or early spring, before Johnson grass has begun to grow, are more satisfactory than during summer or early fall.

It also has been noted that Johnson grass control in drainage ditches is most satisfactory if the treatment is applied shortly after the water has drained away, but while ditch banks still retain some moisture.

Pre-Emergence

After fields have been fallow plowed and headlands and ditch banks have been cleaned up, the third step consists in preventing re-establishment of Johnson grass by control of seedlings in the cane field. Once these seedlings have a chance to form rhizomes, they become quite difficult to eliminate and will serve as a new source of infestation.

"Karmex" W applied as a pre-emergence treatment to sugar cane immediately following planting in the fall or after shaving and off-barring in early spring, has been a very effective treatment for prevention of Johnson grass seedling infestations.

In Hawaii, this pre-emergence type treatment of sugar cane with "Karmex" W was carried out with a great deal of success. There "Karmex" W as a pre-emergence spray, has given outstanding control of annual weeds when applied at a rate of four to six pounds per acre immediately following planting of the cane. This treatment has given 90 per cent or better weed control for from five to 21 weeks with no apparent injury to the crop.

The same general type tests were carried out in Louisiana during 1951 and 1952 by the Lousiana State Experiment Station and by Du Pont representatives. In these tests, "Karmex" W was applied at the rates of one-half to 20 pounds per acre as a pre-emergence spray immediately after shaving and off-barring operations had been concluded in the spring.

Results showed that "Karmex" W applied at the rate of three and three-quarter pounds per acre gave better than 90 per cent control of Johnson grass and other germinating seedlings for periods of from 45 to 60 days, without injury to the cane. In actual practice, this rate was applied only to a two-foot band over the row, accounting for a third of the total acreage, so only one and a quarter pounds of "Karmex" W herbicide was required to treat each acre of cane. In 1953, tests were made on at least 14 different plantations with the largest test covering approximately 30 acres.

It is felt, in view of the excellent results obtained last spring on a majority of the plantations, that "Karmex" W will have a definite place in the Johnson grass seedling control program. It should be applied as a pre-emergence treatment to plant cane in the spring after shaving and off-barring at the rate outlined above.

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USING NEW ODORLESS FINISHES SOLVES MANY FOOD CONTAMINATION PROBLEMS IN FARM PAINTING JOBS

Paint odors, which often give us an excuse for not doing a badly needed painting job, have been virtually eliminated with the introduction of an entire line of odorless finishes.

Farm painting jobs which have been particularly difficult because paint odors tended to impart off-flavors or odors to food products include the interiors of milk houses and barns, egg cleaning and storage rooms, and packing sheds or rooms where fresh fruit or produce is handled. Yet information from Du Pont paint specialists indicates most of these areas may now be coated with the odorless enamels and other finishes without risking food contamination from strong paint odors.

Much of this evidence is based on painting experiences in grocery stores, super-markets, and food processing plants. Stores where all fresh produce and meats have been removed when previous paint jobs were in progress now report that they can carry on "business as usual" during interior painting with the odorless finishes.

Since some foods are more susceptible than others in picking up odors, and since odorless paints do have a slight residual odor from the oxidation of oils in the advance drying stage, Du Pont specialists recommend the following simple test before applying the new paints:

Take a wooden box or paper carton, cut holes in the sides to permit ventilation comparable to that in the room being painted, paint the interior of the box with the finishes to be used and place upside down over a sample of the food being handled in the area you wish to paint. Let the sample remain until paint has dried and if the food has picked up no noticeable taste, it is reasonably safe to proceed.

Another warning is also in order when using these new odorless finishes. Although the painter's nose may not tell him so, solvent vapor will be present in the atmosphere during the painting operation. The need for ventilation, as well as the avoidance of prolonged exposure, is therefore necessary. The odorless solvents in these new paints are neither more nor less hazardous than solvents previously used.

Instructions to users of Du Pont's new odorless paint line also point out that brushes can not be cleaned successfully with odorless thinners. Also, care should be taken not to introduce water into odorless flat paints, since the build-up of an extremely heavy body in the paint may result. This means that partly filled large containers of thinner should not be moved from cold to hot areas quickly, since moisture condensation may take place and water will be introduced into the paint when the thinner is used.

With the observance of these few simple precautions, the satisfaction of being able to paint without disturbing routine day-to-day jobs may be fully realized with the odorless finishes, whether the painting job is in the barn or the kitchen.

METHIONINE IN POULTRY MASH

Results of a Du Pont research program
as reported in THE BROILER JOURNAL.

Increases of seven to 10 per cent in the broiler grower's gross profit result from including free methionine in the mash, according to a recent Du Pont Company report on results of over 200 tests. This increase in return over feed cost is based on a three per cent improvement in weight and more than a three per cent reduction in feed consumed per unit of gain resulting from addition of about one pound of methionine per ton of feed. At average prices for broilers and for feed, such responses can increase profit per 1,000 birds by $20 to $30. Even greater responses can be expected from turkey poults.

In addition to the favorable influence on growth and feed efficiency, methionine has been shown to improve feathering and produce a better grade of dressed birds. While these advantages are more difficult to evaluate in dollars and cents, they are nevertheless of real importance to the broiler grower.

Evidence assembled by Du Pont indicates that free methionine is more than just a substitute for the same amino acid supplied by natural sources. Some of the best results from the use of methionine have been obtained with rations well fortified with fish meal or with fish solubles. In general, benefits have been observed with rations which were adequate in all other known nutrients, and contained all the supplements thought to be of value including antibiotics, arsenicals, and natural ingredients rich in protein-bound methionine.

Four Theories

At least four hypotheses are advanced to explain why free methionine has unique effects which have not been duplicated by any other feed ingredient:

1. The natural sources of methionine in poultry feeds may contain less methionine than commonly believed, because an accurate determination of methionine in feeds is difficult. In such case, the addition of free methionine would bring the methionine level more nearly to the required amount.

2. The methionine requirement of growing birds may be higher than commonly believed. Again, analytical difficulties may have resulted in certain cases in the publication of methionine requirement figures which are too low.

3. Even though the methionine naturally present in feed proteins in the ration may be quantitatively sufficient, it may not be fully available to birds, due to inadequate or delayed digestion. If free methionine has been added to such a ration, it comes to the rescue, correcting the deficiency and providing an emergency source of readily available methionine while the protein methionine is being more slowly liberated.

4. There is some evidence that free methionine in the ration may have certain physiological benefits not directly related to the correction of an ordinary nutritional deficiency of methionine in its functions as an essential amino acid. For example, its presence in free form may possibly have a beneficial effect on intestinal synthesis.

Well Tested

Methionine has been extensively tested as a feed additive, particularly during the past five years, under standard management practices by commercial broiler growers in many parts of the country with virtually all types and strains of birds. The rations used have reflected both local and seasonal variations which commonly occur in broiler mash, starter mash, and turkey feeds.

In three 10-week tests with straight-run New Hampshire chicks, six different diets were compared, with and without methionine. All but one diet contained fish meal. With these rations, methionine improved return over feed cost by an average of 11 per cent. The increase in dollar margin due to methionine ranged from $36 to $56 and averaged $45 per thousand birds.

Tests conducted by the State College of Washington showed an increase in gross profit margin ranging from $13 to $39 with an average increase of $29 per thousand birds resulting from one pound of methionine per ton of feed. Each pound of gain was achieved with about one-third of a pound less feed where methionine was used. With five per cent fish meal in the ration, the gross profit margin per thousand birds was $333. When a pound of methionine was added per ton of feed, this figure was increased to $372, even though fish meal itself is a rich source of methionine.

At the University of Delaware, diets were compared, without methionine and with methionine at various levels. The highest gross profit margin resulted with one-and-one-quarter pounds of methionine per ton of feed added to a diet containing five per cent fish meal.

Texas Tests

Findings at Texas A & M Station at Gonzales have been remarkably consistent in showing the value of methionine as supplement, particularly in the presence of fish meal. Comparison of average weights in Texas tests shows that over fish meal alone, the combination of fish meal and methionine produced heavier birds with greater feed efficiency (0.364 pounds of gain per pound of feed versus 0.342 for birds receiving only fish meal).

Other tests in Texas have demonstrated that the response to methionine is almost exactly the same with or without the antibiotics bacitracin and penicillin, alone or combined.

Du Pont is continuing to study practical aspects of including methionine in the feed, but all evidence to date indicates that it offers the broiler grower substantial advantages, particularly in the current period of high-cost operations.

EXPERIMENTERS' NOTATIONS

A Round-up of Data from Across the Nation

Eight head of breeding bulls, wintered on range in an Oklahoma A & M experiment, were fed an average of 2.9 pounds daily of 25 per cent urea pellets to supplement 2.9 pounds of ground corn, 2.9 pounds of oats, and 12.1 pounds of prairie hay. The bulls gained satisfactorily during the 140-day wintering period and breeding efficiency was not impaired the following season.

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Methoxychlor is a "potent new weapon" being used by gooseberry growers to control the yellow currant fly, adult stage of the gooseberry maggot, according to R. W. Every, Oregon extension entomologist. Applications at the rate of three pounds of 50 per cent wettable methoxychlor ("Marlate" 50-W) per 100 gallons of water should start in April, when flies begin to emerge from the soil. Three to four applications are required. Ferbam or other fungicides can be added to the spray for disease control.

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A new multi-purpose mist blower that weighs only 200 pounds and is reasonably priced has been extensively tested by the Connecticut Agricultural Experiment Station for several seasons and has won approval for many farm uses. Easily mountable on a tractor, small trailer, or pick-up truck, the sprayer is said to do a good job of insect and disease control coverage on row crops, nursery stock, small orchards, small fruits, and grapevines.

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Foot-rot in dairy herbs is a serious problem, particularly in wet weather. University of Illinois reports that tests have shown a 10 to 30 per cent solution of copper sulfate used as a foot bath is an aid in controlling this trouble.

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Two to four pounds of 50 per cent wettable methoxychlor per 100 gallons of spray is recommended for the control of Mexican bean beetle in eastern states in the USDA's recent bulletin on this pest. Dusts containing five to 10 per cent methoxychlor are also suggested. While several insecticides are listed as effective against the beetles, only methoxychlor and parathion among these are suggested for double-duty control when potato leafhopper is also present on beans. If parathion is used, it should not be applied to lima or dry beans within 21 days of harvest, the bulletin points out.

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